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FINAL TECHNICAL REPORT

**ULTRA-LOW LOSS FILMS BY ION-BEAM SPUTTERING FOR NOVEL POLYMER
AND GLASS BASED OPTOELECTRONIC DEVICES
(DURI 98/99)**

GRANT NUMBER F49620-98-1-0273

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Final technical report for the equipment grant for the Ion-Beam Sputtering System purchase

The purchased equipment was the Ionfab 300 Plus from Oxford Instruments Inc. The total system price was \$ 430,000.00 with matching funds from the University of Arizona.

The Ionfab 300 Plus Ion Beam System is configured for sputter deposition of high quality dielectric and metal oxide thin films for optical applications and for etching optical surfaces. The major system features are:

- Ionfab 300 Plus base console with PC Plus hardware and software for operator interface of process control, wafer handling, data logging, and security access.
- Electropolished UHV process chamber with one set of removable stainless steel liners.
- Deposition Target Holder (4 x 6") with rotatable shield and two spare backing plates.
- Substrate holder and water-cooled clamping mechanism for 6" wafers, with gas admission and control system for backside cooling.
- One 15-cm-diameter ion source with automatic matching network for etching optical surfaces and ion assisted deposition.
- One 3-cm-diameter ion source with automatic matching network for depositing high quality films.
- Etch/deposition pumping layout for moisture sensitive materials with isolation gate valve.
- An Austin Scientific cryogenic Cryo-Plex 8LP cryo pump.
- Console mounted gas pod with 5 mass-flow-controlled gas lines. Four lines are dedicated to the ion sources, one to the chamber.
- Leybold XTM/2 quartz crystal film thickness monitor, single head detector with shutter.

The equipment has been an important tool in our research and development of nano-structured opto-electronic components. Among them are electro-active waveguides for research in spectroelectrochemistry, dielectric multilayer stacks for active optical components, and integrated optical devices in glass and semiconductor materials.